Precipitation Analysis Instructions
Using
PRISM and GIS

In order to increase the accuracy of regional rainfall estimates, DWR uses a GIS format to calculate and analyze California's complex precipitation patterns. After several attempts at modeling historical precipitation using the model techniques available within ESRI's ArcView 3.2 and the **P**arameter-elevation **R**egressions on **I**ndependent **S**lopes **M**odel (PRISM) model developed by Oregon State University, we chose to use the PRISM model technique. This modeling technique [independent of the data set used] shows more consistent results statewide than ESRI's modeling system of Inverse Distance Weighted (IDW) interpolator. Both models have their advantages, but the PRISM model accounts for slope, aspect, and elevation among other intricate elements of such modeling. For more detailed information regarding PRISM use the following URL--http://www.ocs.orst.edu/PRISM/gen_toc.html.

The base data use for the 1961-1990 thirty-year normal was taken from the National Weather Service (NWS), California Normal Stations (nearly 400 stations.) These stations were active during the entire 1961-1990 period. Today approximately 95% of them remain in full operation. These stations were compared with the PRISM 1961-1990 map and a difference was calculated for each station. The reason for using the NWS 1961-1990 data sets versus the more current NWS 1971-2000 data set was to ensure consistency in our data comparisons. With further analysis it became clear that PRISM's approach to precipitation and dealing with elevation, slope, and aspect helped create a smooth transition from high mountain stations to low valley floor stations.

The general approach is to obtain the PRISM 30 year normal layer setup in 1000-meter (m) grids, then take the precipitation data for 1998, 2000, and 2001 and create a 1000 m grid layer. These layers are overlaid and map algebra is used to compute variation from the normal layer. Once a difference has been established, the volume of water is computed for each detailed analysis unit (DAU) and planning area (PA) within the State.

The following is a step-by-step procedure for the precipitation modeling for California. First step is to download the PRISM data layer from Oregon State University, Corvallis and convert from an ASCII format to one usable by ESRI's ArcView3.x. PRISM is built on a 4000 m system, so there is a need to resample this system and convert it to a 1000m grid. We so this to have a true and accurate overlay with our 1000 m precipitation data.

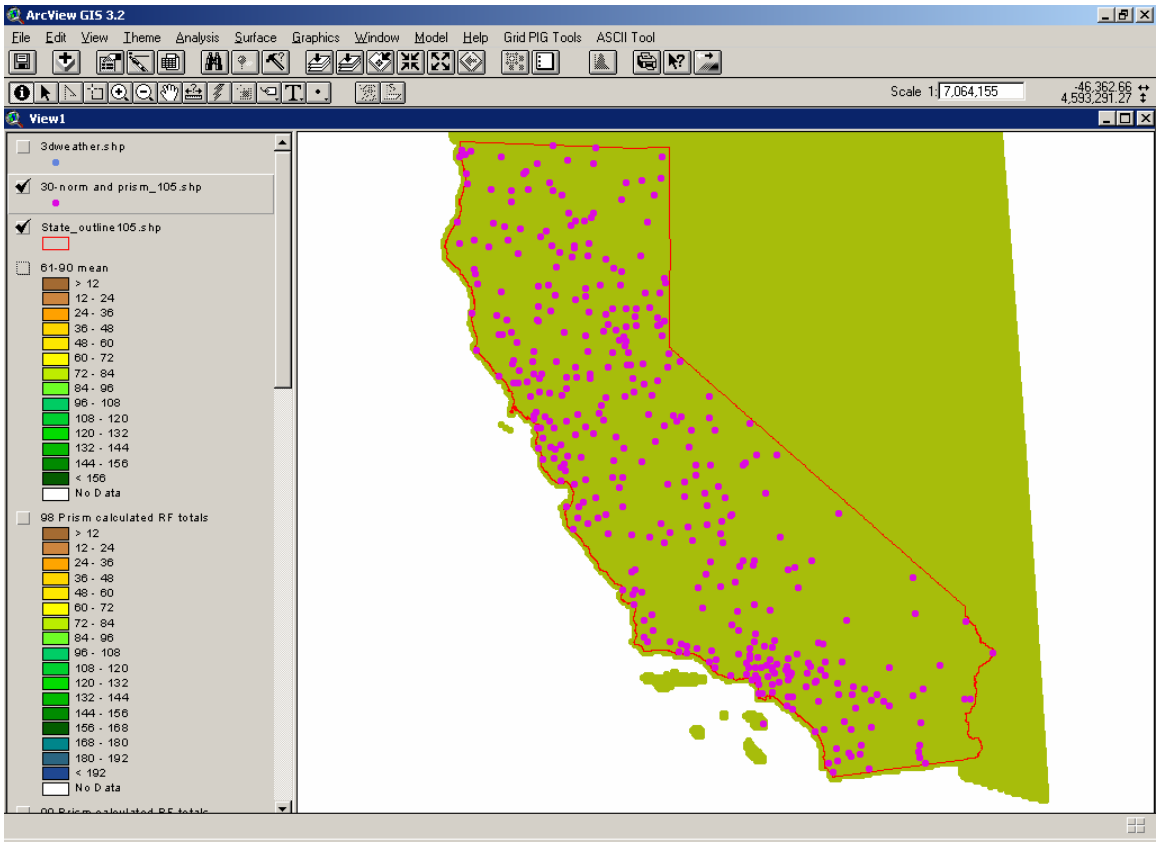


Figure 1.

In this image the yellow-green color is the PRISM point layer in point format (see figure 1). The pink dots represent the location of the weather stations associated with the NWS 30 year Normal. (All station point locations are stored in latitude/longitude coordinates as measured by the NWS.) The red outline shows California's position in regards to the data.

Next, reclassify the PRISM 30 year shape file to display the various precipitation amounts statewide. The breakdown could be a color change every 12 inches, i.e. 0-12 inches is dark brown, 12-24 inches is light brown…84-96 inches is bright green. Experiment with various other increments for the breakdown to see if 12 inches will work best for the data being evaluated.

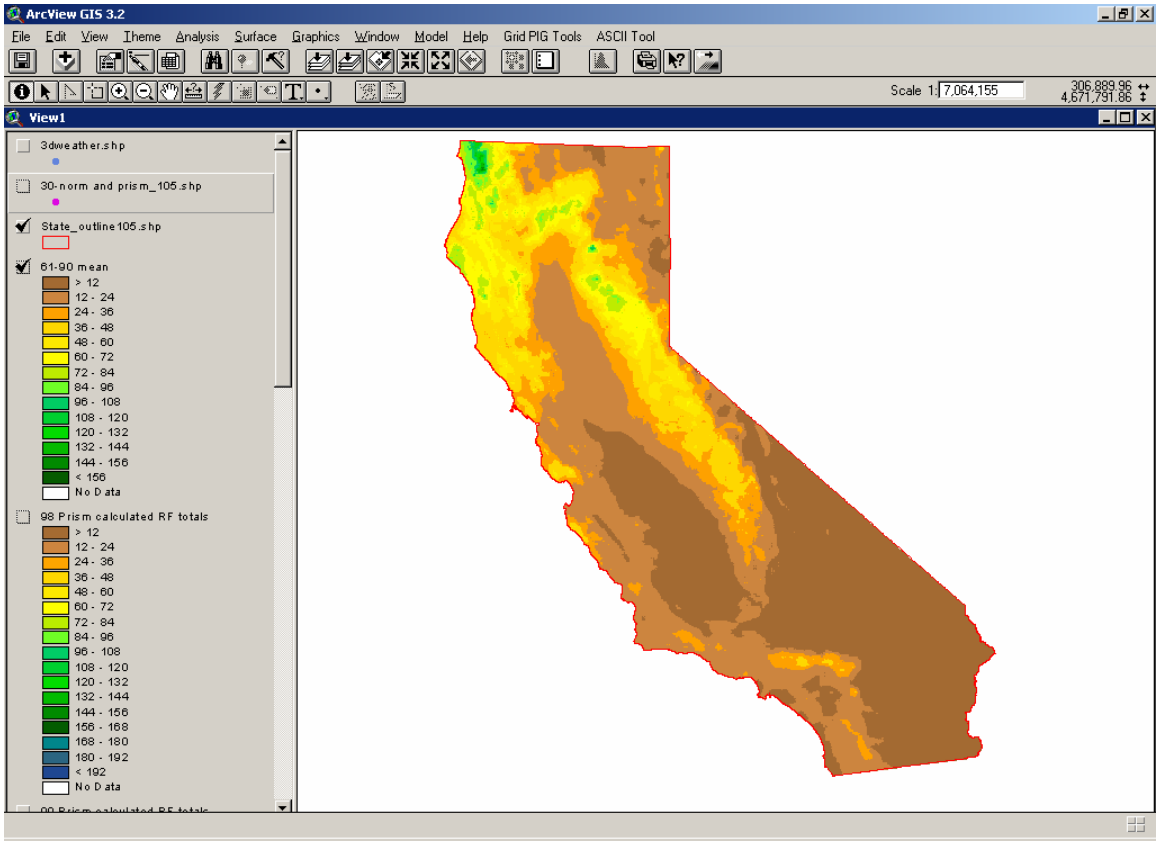
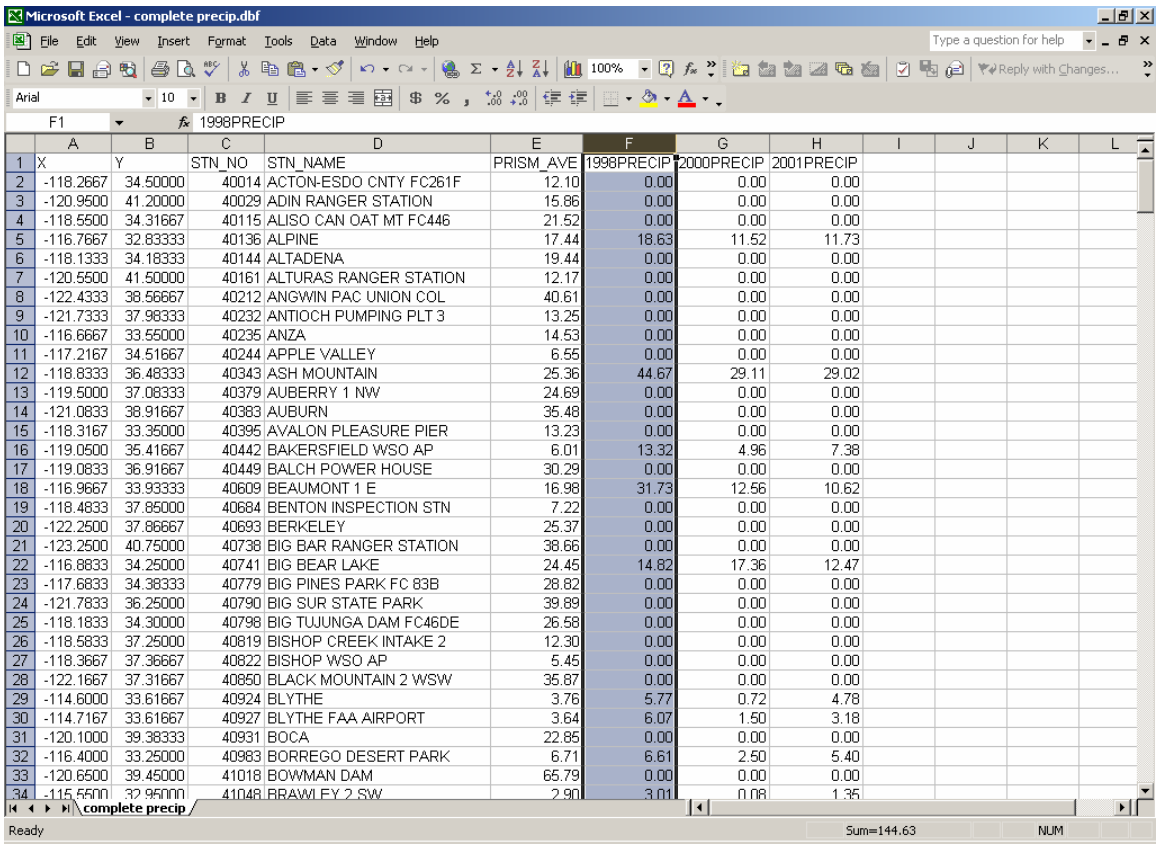


Figure 2.

Now there is a valid 30-year average layer to calculate the variation of precipitation from year to year (see figure 2). These calculations will be done using a feature called the Map Calculator in ArcView. This feature allows the user to do map algebra between similar coverage layers (two or more) or to make adjustments to any single layer. In doing so, it creates another grid based on the mathematical outcome.

With this technique available for multi-layer calculations, gather the available weather data for each of the NWS California Normal Stations for the years 1998, 2000, and 2001 (see figure 3). In the weather station point file, enter the annual precipitation values for each given year into the DBF file.



	A	B	C	D	E	F	G	H	I	J	K	L
1	X	Y	STN_NO	STN_NAME	PRISM_AVE	1998PRECIP	2000PRECIP	2001PRECIP				
2	-118.2667	34.50000	40014	ACTON-ESDO CNTY FC261F	12.10	0.00	0.00	0.00				
3	-120.9500	41.20000	40029	ADIN RANGER STATION	15.86	0.00	0.00	0.00				
4	-118.5500	34.31667	40115	ALISO CAN OAT MT FC446	21.52	0.00	0.00	0.00				
5	-116.7667	32.83333	40136	ALPINE	17.44	18.63	11.52	11.73				
6	-118.1333	34.18333	40144	ALTADENA	19.44	0.00	0.00	0.00				
7	-120.5500	41.50000	40161	ALTURAS RANGER STATION	12.17	0.00	0.00	0.00				
8	-122.4333	38.56667	40212	ANGWIN PAC UNION COL	40.61	0.00	0.00	0.00				
9	-121.7333	37.98333	40232	ANTIOCH PUMPING PLT 3	13.25	0.00	0.00	0.00				
10	-116.6667	33.55000	40235	ANZA	14.53	0.00	0.00	0.00				
11	-117.2167	34.51667	40244	APPLE VALLEY	6.55	0.00	0.00	0.00				
12	-118.8333	36.48333	40343	ASH MOUNTAIN	25.36	44.67	29.11	29.02				
13	-119.5000	37.08333	40379	AUBERRY 1 NW	24.69	0.00	0.00	0.00				
14	-121.0833	38.91667	40383	AUBURN	35.48	0.00	0.00	0.00				
15	-118.3167	33.35000	40395	AVALON PLEASURE PIER	13.23	0.00	0.00	0.00				
16	-119.0500	35.41667	40442	BAKERSFIELD WSO AP	6.01	13.32	4.96	7.38				
17	-119.0833	36.91667	40449	BALCH POWER HOUSE	30.29	0.00	0.00	0.00				
18	-116.9667	33.93333	40609	BEAUMONT 1 E	16.98	31.73	12.56	10.62				
19	-118.4833	37.85000	40684	BENTON INSPECTION STN	7.22	0.00	0.00	0.00				
20	-122.2500	37.86667	40693	BERKELEY	25.37	0.00	0.00	0.00				
21	-123.2500	40.75000	40738	BIG BAR RANGER STATION	38.66	0.00	0.00	0.00				
22	-116.8833	34.25000	40741	BIG BEAR LAKE	24.45	14.82	17.36	12.47				
23	-117.6833	34.38333	40779	BIG PINES PARK FC 83B	28.82	0.00	0.00	0.00				
24	-121.7833	36.25000	40790	BIG SUR STATE PARK	39.89	0.00	0.00	0.00				
25	-118.1833	34.30000	40798	BIG TUJUNGA DAM FC46DE	26.58	0.00	0.00	0.00				
26	-118.5833	37.25000	40819	BISHOP CREEK INTAKE 2	12.30	0.00	0.00	0.00				
27	-118.3667	37.36667	40822	BISHOP WSO AP	5.45	0.00	0.00	0.00				
28	-122.1667	37.31667	40850	BLACK MOUNTAIN 2 WSW	35.87	0.00	0.00	0.00				
29	-114.6000	33.61667	40924	BLYTHE	3.76	5.77	0.72	4.78				
30	-114.7167	33.61667	40927	BLYTHE FAA AIRPORT	3.64	6.07	1.50	3.18				
31	-120.1000	39.38333	40931	BOCA	22.85	0.00	0.00	0.00				
32	-116.4000	33.25000	40983	BORREGO DESERT PARK	6.71	6.61	2.50	5.40				
33	-120.6500	39.45000	41018	BOWMAN DAM	65.79	0.00	0.00	0.00				
34	-115.5500	32.95000	41048	BRAWLEY 2 SW	2.90	3.01	0.08	1.35				

Figure 3.

When the file is fully populated with all the precipitation data, we then use a function called Interpolate Grid. This function takes the data entered into the point file and creates a grid by using IDW interpolation method. This process assumes that each input point has a local influence that diminishes with distance. It weights the points closer to the selected weather monitoring station more than those further away. A specified number of points may be chosen to use in the analysis, or all points within a specified radius, can be used to determine the output value for each precipitation station. We used the specified number of points approach (see figure 4).

In setting up this grid process one must specify the output grid extent and the output grid cell size. Set the Grid Output Extent and Grid Output Cell Size to the same coverage (see figure 5). Now verify that the cell size is set to 1000 m to match the PRISM 30-year precipitation layer. This helps in assuring that the two grids will overlay each other cleanly. This process is completed for each of our water years.

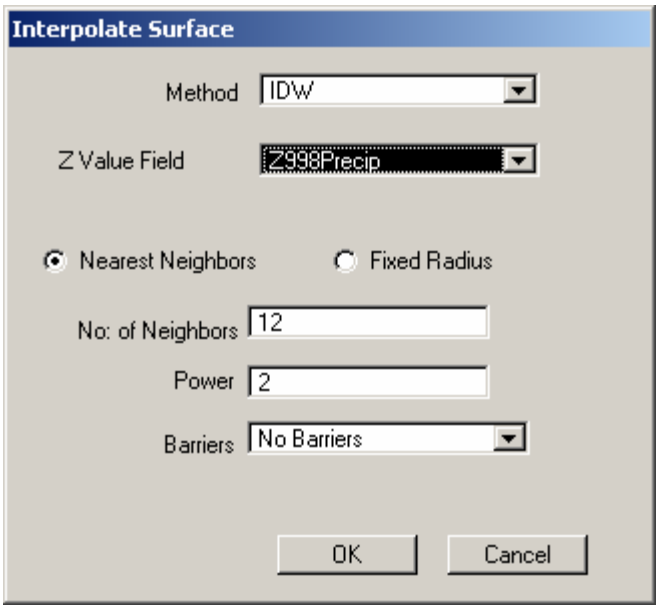


Figure 4.

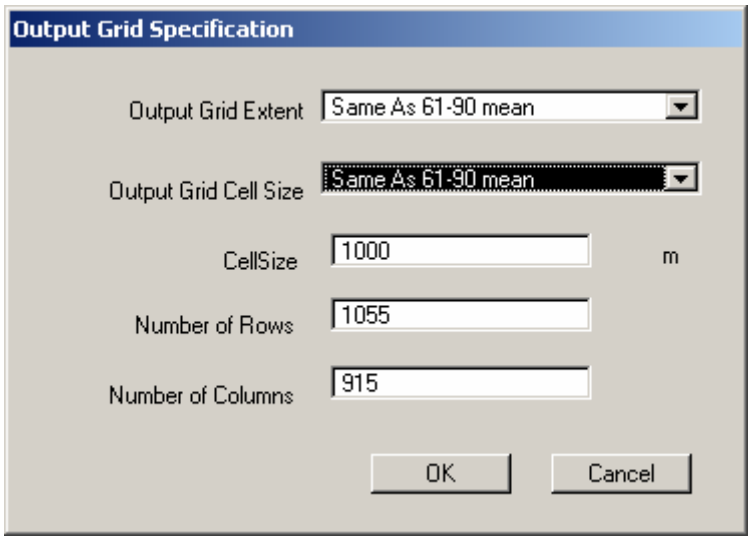


Figure 5.

The PRISM software takes into account the surrounding states of Oregon, Nevada, and Arizona and also Mexico (see figure 1). When creating a grid, IDW builds its data based upon the maximum extent of the image being used. Using this extra data helps create a more realistic picture of California's precipitation picture. Next a tool is used to constrain the data outside of California's borders. This is seen as the light gray color surrounding California and shows the extent of the IDW grid. Each grid will need to be clipped to match the actual border of the State. In this process, the values of the data falling outside of the border are set to zero. Next, a color is attached to the zero values so that California's shape becomes apparent (typical color is set to white for better focus on the key feature). There are tools available for such cropping from the ESRI website: http://www.esri.com/ (homepage) http://arcscripts.esri.com/ (downloadable script page). This shall be done to help in visualizing California's boundaries.

Next do map algebra on the newly created rainfall layers of 1998, 2000, & 2001 (see figure 6). Once the map algebra has been completed, the output coverage will show a difference in percent from the precipitation year (1998, 2000, or 2001) to that of the 1961-1990 thirty-year average. This percent difference is presented as a grid and is now multiplied by the 30-year normal grid. The outcome of this mathematical analysis will be actual precipitation for a given 1000m grid expressed in inches. Like the 30 year average coverage, each year is broken out into a different color every 12 inches, i.e. 0-12 inches is dark brown, 12-24 inches is light brown…84-96 inches is bright green and ending with dark green for all precipitation over 152 inches. Some years may receive more precipitation like 1998 in which totals for some locations totals were over 192 inches. In this case, one must expand the color range for that given year. Other years, like 2001, may require a reduction in the color ranges due to the lack of precipitation.

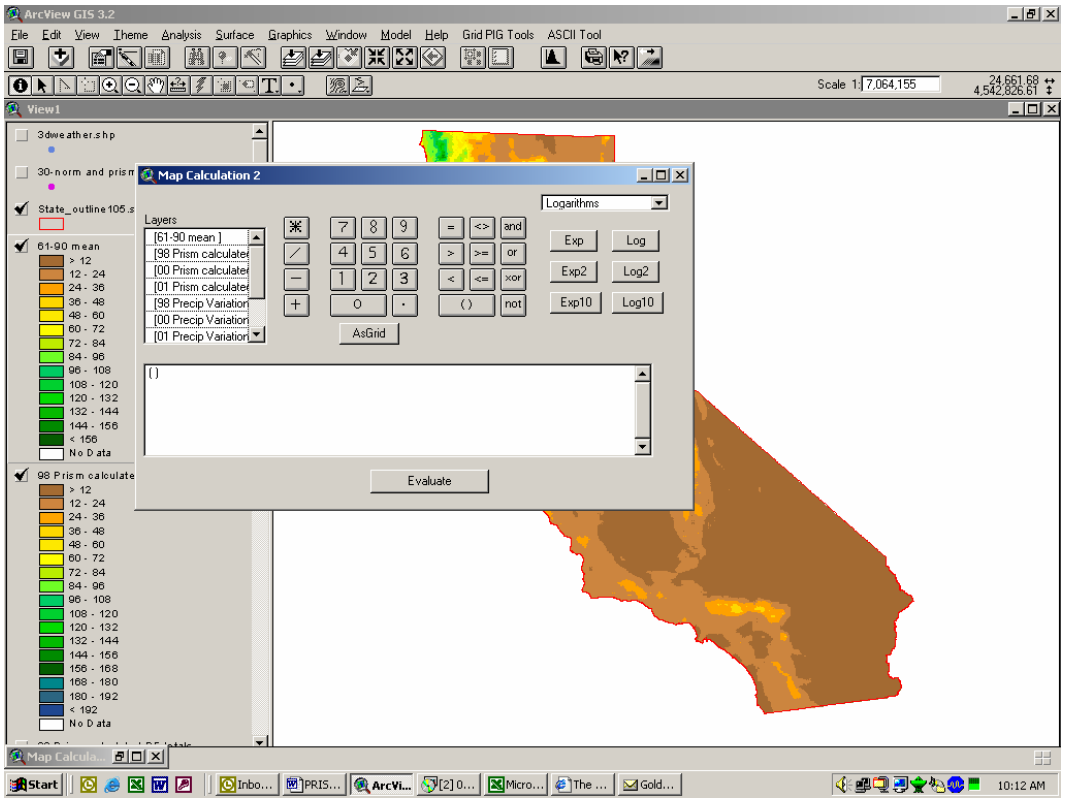


Figure 6.

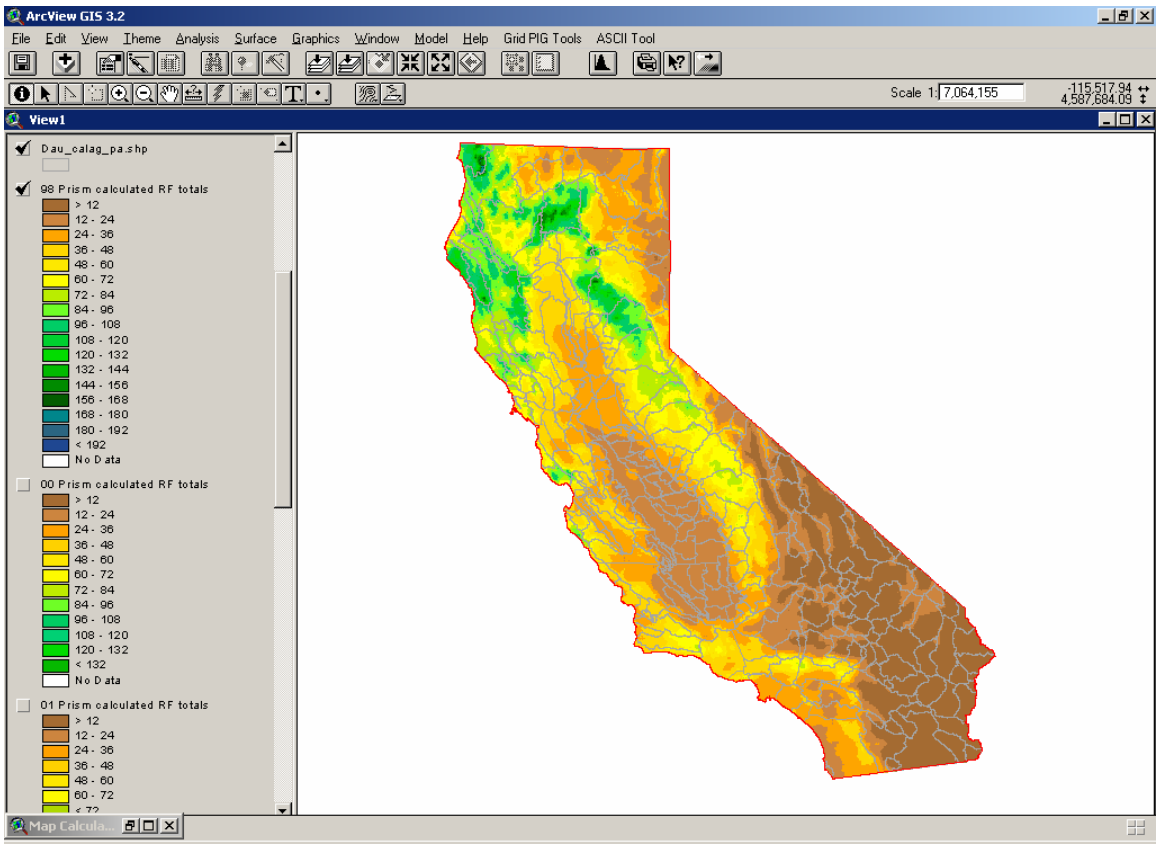
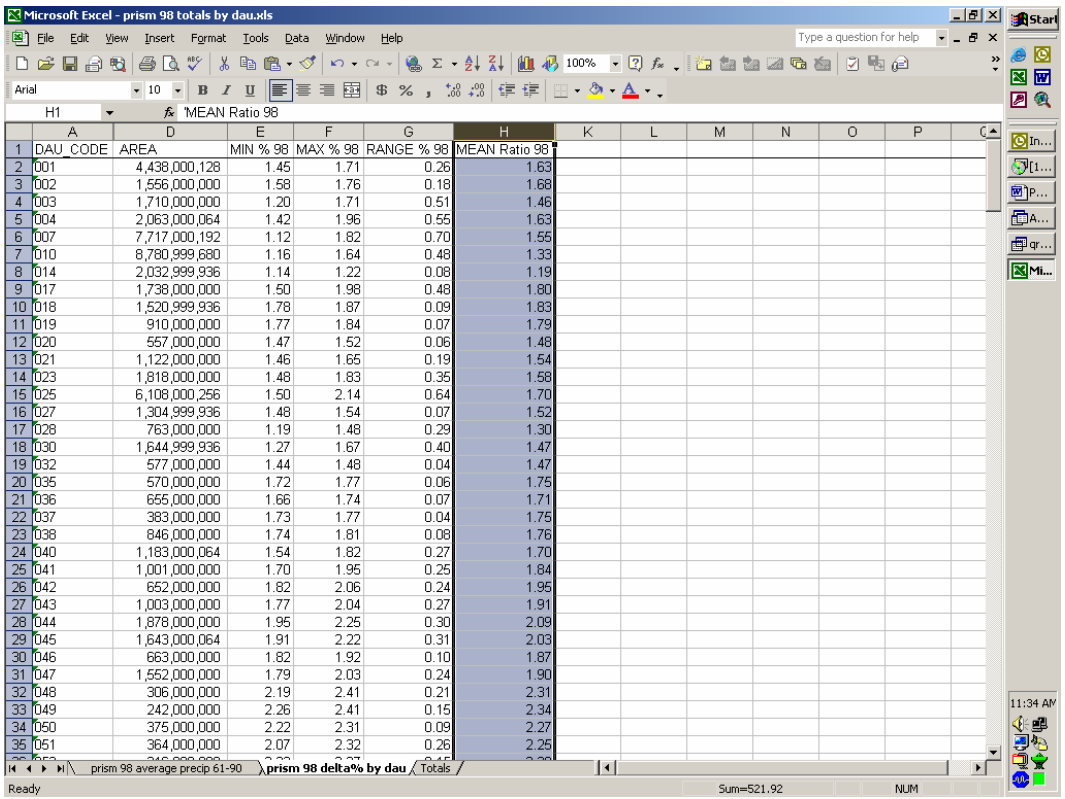


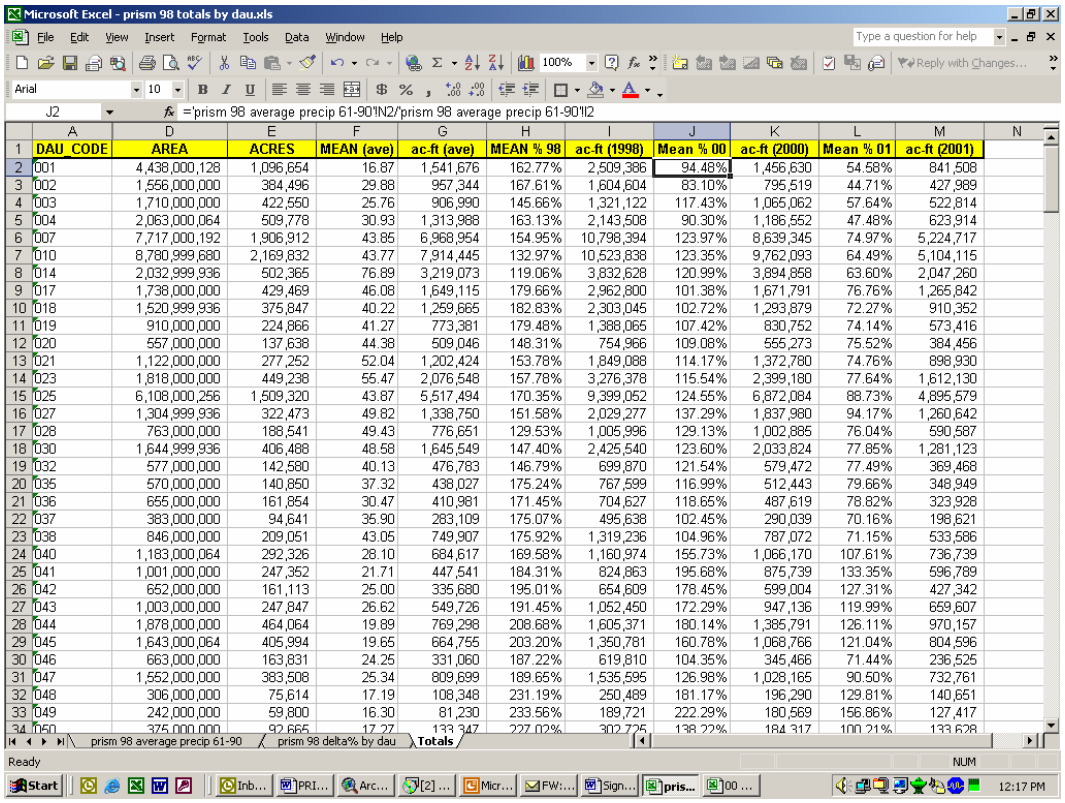
Figure 7.

With each year sub-divided into 12-inch increments, overlay the DAU coverage (see figure 7) to analyze the total volume of precipitation at that geographic level. Once we have a volume of water in a DAU, it can be aggregated up to Planning Areas (PA), Hydrologic Regions (HR), and even the special study area of Mountain Counties (PA 508, 604, & 610-as designated in B160-03). The DAU analysis data encompasses the DAU number, the area in total square meters, the minimum depth of water, the maximum depth of water, the range from minimum to maximum, and the average depth of water for that DAU (see figure 8). With some simple mathematics you can calculate the actual percentage for a DAU in a specific year (see figure 9).



	A	D	E	F	G	H
1	DAU_CODE	AREA	MIN % 98	MAX % 98	RANGE % 98	MEAN Ratio 98
2	001	4,438,000,128	1.45	1.71	0.26	1.63
3	002	1,556,000,000	1.58	1.76	0.18	1.68
4	003	1,710,000,000	1.20	1.71	0.51	1.46
5	004	2,063,000,064	1.42	1.96	0.55	1.63
6	007	7,717,000,192	1.12	1.82	0.70	1.55
7	010	8,780,999,680	1.16	1.64	0.48	1.33
8	014	2,032,999,936	1.14	1.22	0.08	1.19
9	017	1,738,000,000	1.50	1.98	0.48	1.80
10	018	1,520,999,936	1.78	1.87	0.09	1.83
11	019	910,000,000	1.77	1.84	0.07	1.79
12	020	557,000,000	1.47	1.52	0.06	1.48
13	021	1,122,000,000	1.46	1.65	0.19	1.54
14	023	1,818,000,000	1.48	1.83	0.35	1.58
15	025	6,108,000,256	1.50	2.14	0.64	1.70
16	027	1,304,999,936	1.48	1.54	0.07	1.52
17	028	763,000,000	1.19	1.48	0.29	1.30
18	030	1,644,999,936	1.27	1.67	0.40	1.47
19	032	577,000,000	1.44	1.48	0.04	1.47
20	035	570,000,000	1.72	1.77	0.06	1.75
21	036	655,000,000	1.66	1.74	0.07	1.71
22	037	383,000,000	1.73	1.77	0.04	1.75
23	038	846,000,000	1.74	1.81	0.08	1.76
24	040	1,183,000,064	1.54	1.82	0.27	1.70
25	041	1,001,000,000	1.70	1.95	0.25	1.84
26	042	652,000,000	1.82	2.06	0.24	1.95
27	043	1,003,000,000	1.77	2.04	0.27	1.91
28	044	1,878,000,000	1.95	2.25	0.30	2.09
29	045	1,643,000,064	1.91	2.22	0.31	2.03
30	046	663,000,000	1.82	1.92	0.10	1.87
31	047	1,552,000,000	1.79	2.03	0.24	1.90
32	048	306,000,000	2.19	2.41	0.21	2.31
33	049	242,000,000	2.26	2.41	0.15	2.34
34	050	375,000,000	2.22	2.31	0.09	2.27
35	051	364,000,000	2.07	2.32	0.26	2.25

Figure 8.

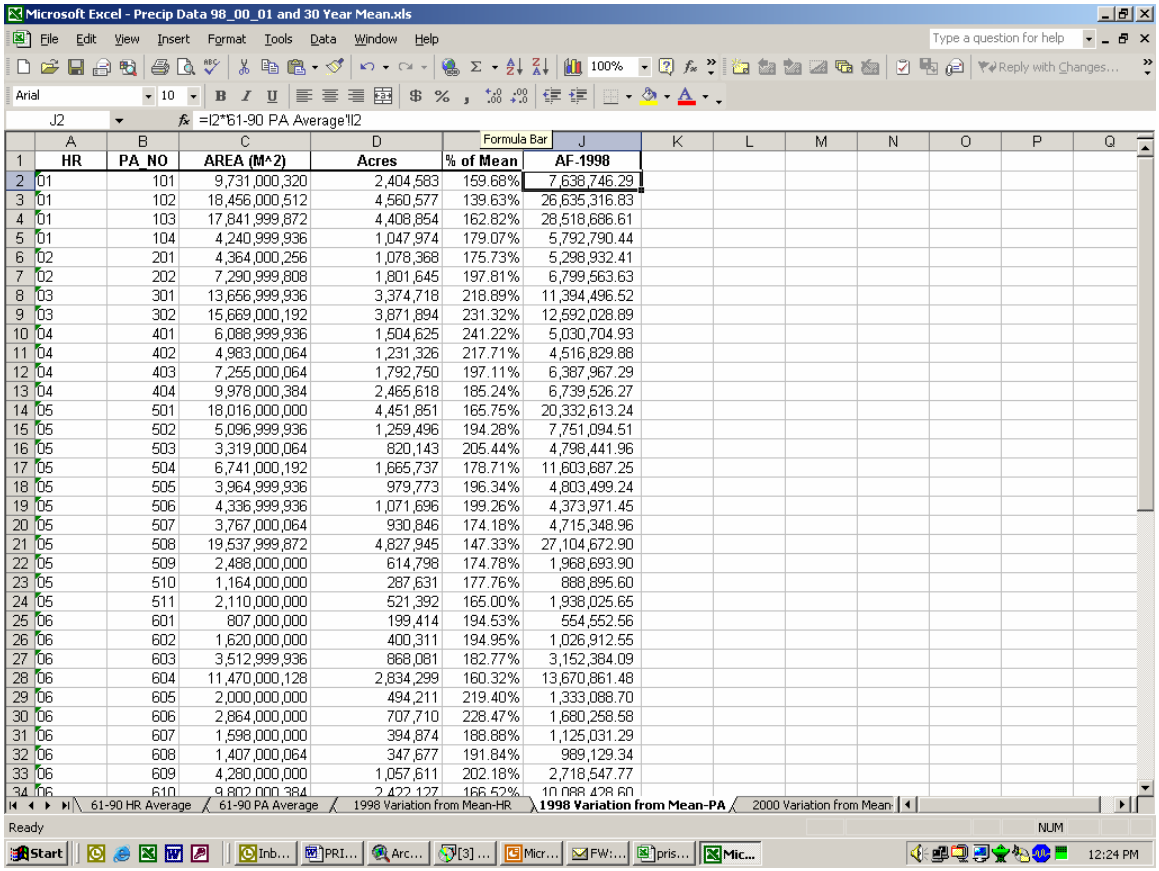


	A	D	E	F	G	H	I	J	K	L	M	N
1	DAU_CODE	AREA	ACRES	MEAN (ave)	ac-ft (ave)	MEAN % 98	ac-ft (1998)	Mean % 00	ac-ft (2000)	Mean % 01	ac-ft (2001)	
2	001	4,438,000,128	1,096,654	16.87	1,541,676	162.77%	2,509,386	94.48%	1,456,630	54.58%	841,508	
3	002	1,556,000,000	384,496	29.88	957,344	167.61%	1,604,604	83.10%	795,519	44.71%	427,989	
4	003	1,710,000,000	422,550	25.76	906,990	145.66%	1,321,122	117.43%	1,065,062	57.64%	522,814	
5	004	2,063,000,064	509,778	30.93	1,313,988	163.13%	2,143,508	90.30%	1,186,552	47.48%	623,914	
6	007	7,717,000,192	1,906,912	43.85	6,968,954	154.95%	10,798,394	123.97%	8,639,345	74.97%	5,224,717	
7	010	8,780,999,680	2,169,832	43.77	7,914,445	132.97%	10,523,838	123.35%	9,762,093	64.49%	5,104,115	
8	014	2,032,999,936	502,365	76.89	3,219,073	119.06%	3,832,628	120.99%	3,894,858	63.60%	2,047,260	
9	017	1,738,000,000	429,469	46.08	1,649,115	179.66%	2,962,800	101.38%	1,671,791	76.76%	1,265,842	
10	018	1,520,999,936	375,847	40.22	1,259,665	182.83%	2,303,045	102.72%	1,293,879	72.27%	910,352	
11	019	910,000,000	224,866	41.27	773,381	179.48%	1,388,065	107.42%	830,752	74.14%	573,416	
12	020	557,000,000	137,638	44.38	509,046	148.31%	754,966	109.08%	555,273	75.52%	384,456	
13	021	1,122,000,000	277,252	52.04	1,202,424	153.78%	1,849,088	114.17%	1,372,780	74.76%	898,930	
14	023	1,818,000,000	449,238	55.47	2,076,548	157.78%	3,276,378	115.54%	2,399,180	77.64%	1,612,130	
15	025	6,108,000,256	1,509,320	43.87	5,517,494	170.35%	9,399,052	124.55%	6,872,084	88.73%	4,895,579	
16	027	1,304,999,936	322,473	49.82	1,338,750	151.58%	2,029,277	137.29%	1,837,980	94.17%	1,260,642	
17	028	763,000,000	188,541	49.43	776,651	129.53%	1,005,996	129.13%	1,002,885	76.04%	590,587	
18	030	1,644,999,936	406,488	48.58	1,645,549	147.40%	2,425,540	123.60%	2,033,824	77.85%	1,281,123	
19	032	577,000,000	142,580	40.13	476,783	146.79%	699,870	121.54%	579,472	77.49%	369,468	
20	035	570,000,000	140,850	37.32	438,027	175.24%	767,599	116.99%	512,443	79.66%	348,949	
21	036	655,000,000	161,854	30.47	410,981	171.45%	704,627	118.65%	487,619	78.82%	323,928	
22	037	383,000,000	94,641	35.90	283,109	175.07%	495,638	102.45%	290,039	70.16%	198,621	
23	038	846,000,000	209,051	43.05	749,907	175.92%	1,319,236	104.96%	787,072	71.15%	533,586	
24	040	1,183,000,064	292,326	28.10	684,617	169.58%	1,160,974	155.73%	1,066,170	107.61%	736,739	
25	041	1,001,000,000	247,352	21.71	447,541	184.31%	824,863	195.68%	875,739	133.35%	596,789	
26	042	652,000,000	161,113	25.00	335,680	195.01%	654,609	178.45%	599,004	127.31%	427,342	
27	043	1,003,000,000	247,847	26.62	549,726	191.45%	1,052,450	172.29%	947,136	119.99%	659,607	
28	044	1,878,000,000	464,064	19.89	769,298	208.68%	1,605,371	180.14%	1,385,791	126.11%	970,157	
29	045	1,643,000,064	405,994	19.65	664,755	203.20%	1,350,781	160.78%	1,068,766	121.04%	804,596	
30	046	663,000,000	163,831	24.25	331,060	187.22%	619,810	104.35%	345,466	71.44%	236,525	
31	047	1,552,000,000	383,508	25.34	809,699	189.65%	1,535,595	126.98%	1,028,165	90.50%	732,761	
32	048	306,000,000	75,614	17.19	108,348	231.19%	250,489	181.17%	196,290	129.81%	140,651	
33	049	242,000,000	59,800	16.30	81,230	233.56%	189,721	222.29%	180,569	156.86%	127,417	
34	050	375,000,000	92,665	17.27	133,347	227.02%	302,725	138.22%	184,317	100.21%	133,628	

Figure 9.

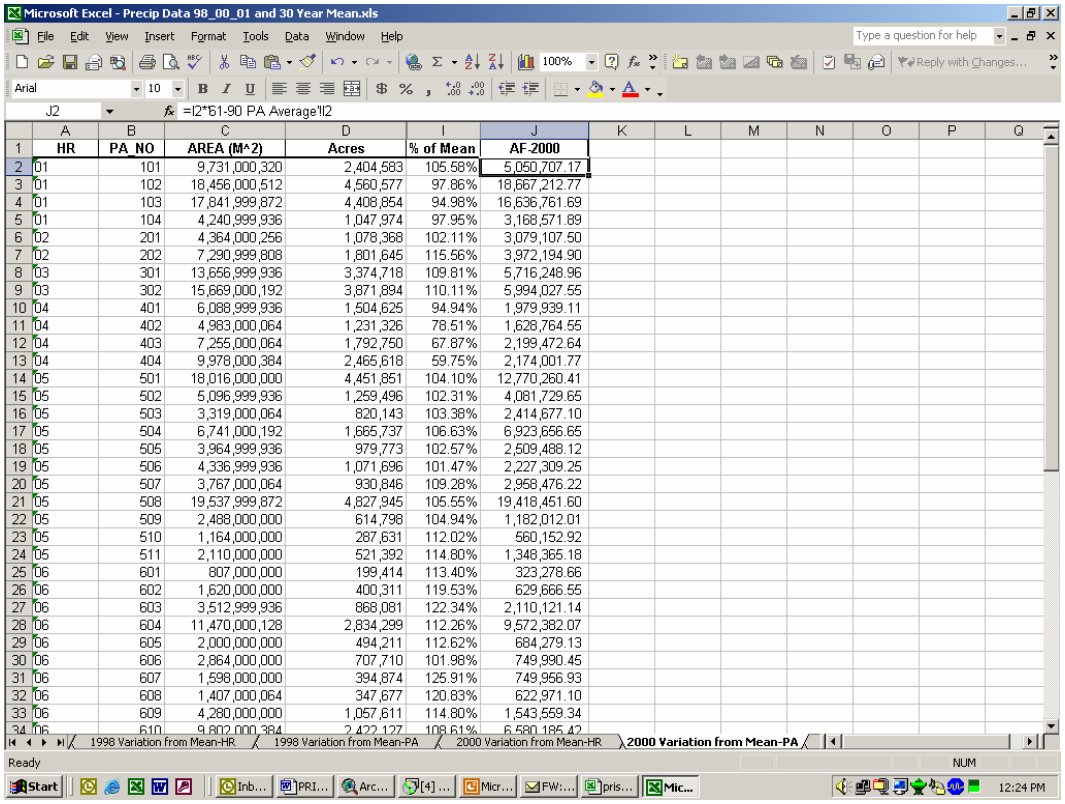
The DAU data is presented in square meters and a conversion is needed to change this to acres. This conversion ratio is m^2 * 0.00024710538. Once the area numbers are converted to acres, then multiply the acreage by the DAU average precipitation percentage of mean to get a volume of water for any given location. These numbers are now exported into Microsoft Access and linked with PA and HR tables. This linking gives the flexibility of quickly changing any data set from one geographical unit to another.

As an example the PA totals for California look at the following image for 1998, 2000, & 2001 (see figures 10, 11, & 12 respectively).



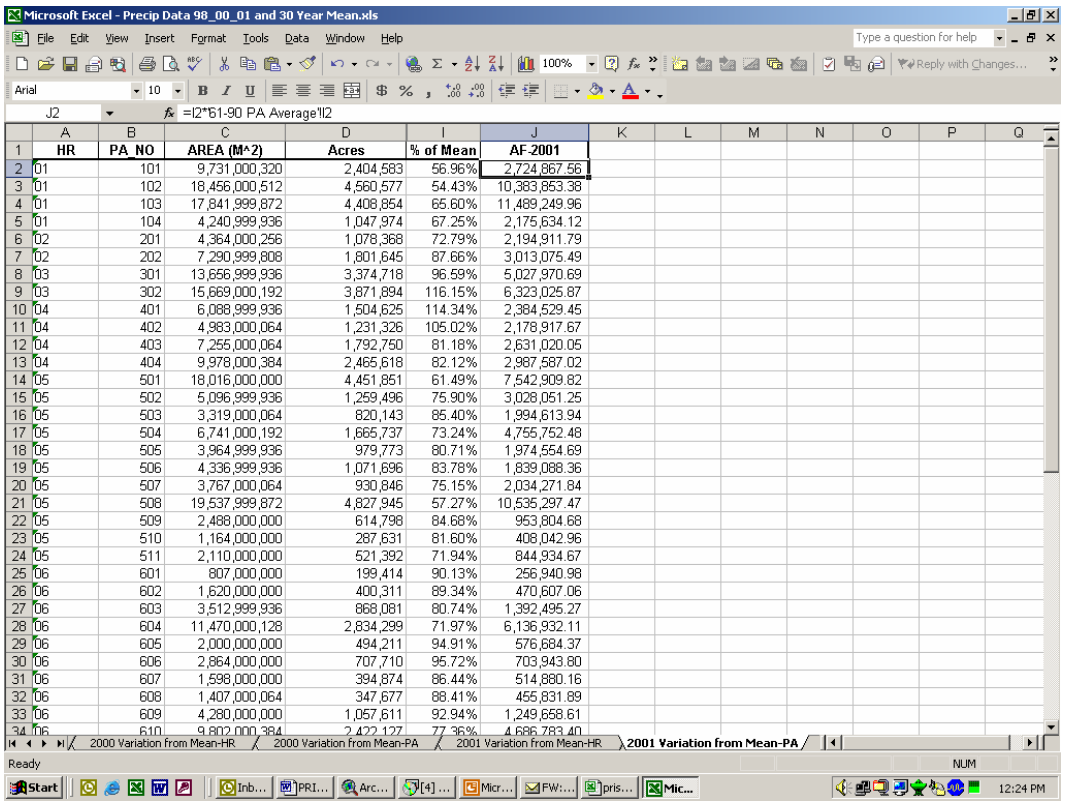
	A	B	C	D		J	K	L	M	N	O	P	Q
1	HR	PA_NO	AREA (M^2)	Acres	% of Mean	AF-1998							
2	01	101	9,731,000,320	2,404,583	159.68%	7,638,746.29							
3	01	102	18,456,000,512	4,560,577	139.63%	26,635,316.83							
4	01	103	17,841,999,872	4,408,854	162.82%	28,518,686.61							
5	01	104	4,240,999,936	1,047,974	179.07%	5,792,790.44							
6	02	201	4,364,000,256	1,078,368	175.73%	5,298,932.41							
7	02	202	7,290,999,808	1,801,645	197.81%	6,799,563.63							
8	03	301	13,656,999,936	3,374,718	218.89%	11,394,496.52							
9	03	302	15,669,000,192	3,871,894	231.32%	12,592,028.89							
10	04	401	6,088,999,936	1,504,625	241.22%	5,030,704.93							
11	04	402	4,983,000,064	1,231,326	217.71%	4,516,829.88							
12	04	403	7,255,000,064	1,792,750	197.11%	6,387,967.29							
13	04	404	9,978,000,384	2,465,618	185.24%	6,739,526.27							
14	05	501	18,016,000,000	4,451,851	165.75%	20,332,613.24							
15	05	502	5,096,999,936	1,259,496	194.28%	7,751,094.51							
16	05	503	3,319,000,064	820,143	205.44%	4,798,441.96							
17	05	504	6,741,000,192	1,665,737	178.71%	11,603,687.25							
18	05	505	3,964,999,936	979,773	196.34%	4,803,499.24							
19	05	506	4,336,999,936	1,071,696	199.26%	4,373,971.45							
20	05	507	3,767,000,064	930,846	174.18%	4,715,348.96							
21	05	508	19,537,999,872	4,827,945	147.33%	27,104,672.90							
22	05	509	2,488,000,000	614,798	174.78%	1,968,693.90							
23	05	510	1,164,000,000	287,631	177.76%	888,895.60							
24	05	511	2,110,000,000	521,392	165.00%	1,938,025.65							
25	06	601	807,000,000	199,414	194.53%	554,552.56							
26	06	602	1,620,000,000	400,311	194.95%	1,026,912.55							
27	06	603	3,512,999,936	868,081	182.77%	3,152,384.09							
28	06	604	11,470,000,128	2,834,299	160.32%	13,670,861.48							
29	06	605	2,000,000,000	494,211	219.40%	1,333,088.70							
30	06	606	2,864,000,000	707,710	228.47%	1,680,258.58							
31	06	607	1,598,000,000	394,874	188.88%	1,125,031.29							
32	06	608	1,407,000,064	347,677	191.84%	989,129.34							
33	06	609	4,280,000,000	1,057,611	202.18%	2,718,547.77							
34	06	610	9,802,000,384	2,422,127	166.52%	10,088,428.60							

Figure 10.



	A	B	C	D	I	J
1	HR	PA_NO	AREA (M^2)	Acres	% of Mean	AF-2000
2	01	101	9,731,000,320	2,404,583	105.58%	5,050,707.17
3	01	102	18,456,000,512	4,560,577	97.86%	18,667,212.77
4	01	103	17,841,999,872	4,408,854	94.98%	16,636,761.69
5	01	104	4,240,999,936	1,047,974	97.95%	3,168,571.89
6	02	201	4,364,000,256	1,078,368	102.11%	3,079,107.50
7	02	202	7,290,999,808	1,801,645	115.56%	3,972,194.90
8	03	301	13,656,999,936	3,374,718	109.81%	5,716,248.96
9	03	302	15,669,000,192	3,871,894	110.11%	5,994,027.55
10	04	401	6,088,999,936	1,504,625	94.94%	1,979,939.11
11	04	402	4,983,000,064	1,231,326	78.51%	1,628,764.55
12	04	403	7,255,000,064	1,792,750	67.87%	2,199,472.64
13	04	404	9,978,000,384	2,465,618	59.75%	2,174,001.77
14	05	501	18,016,000,000	4,451,851	104.10%	12,770,260.41
15	05	502	5,096,999,936	1,259,496	102.31%	4,081,729.65
16	05	503	3,319,000,064	820,143	103.38%	2,414,677.10
17	05	504	6,741,000,192	1,665,737	106.63%	6,923,656.65
18	05	505	3,964,999,936	979,773	102.57%	2,509,488.12
19	05	506	4,336,999,936	1,071,696	101.47%	2,227,309.25
20	05	507	3,767,000,064	930,846	109.28%	2,958,476.22
21	05	508	19,537,999,872	4,827,945	105.55%	19,418,451.60
22	05	509	2,488,000,000	614,798	104.94%	1,182,012.01
23	05	510	1,164,000,000	287,631	112.02%	560,152.92
24	05	511	2,110,000,000	521,392	114.80%	1,348,365.18
25	06	601	807,000,000	199,414	113.40%	323,278.66
26	06	602	1,620,000,000	400,311	119.53%	629,666.55
27	06	603	3,512,999,936	868,081	122.34%	2,110,121.14
28	06	604	11,470,000,128	2,834,299	112.26%	9,572,382.07
29	06	605	2,000,000,000	494,211	112.62%	684,279.13
30	06	606	2,864,000,000	707,710	101.98%	749,990.45
31	06	607	1,598,000,000	394,874	125.91%	749,956.93
32	06	608	1,407,000,064	347,677	120.83%	622,971.10
33	06	609	4,280,000,000	1,057,611	114.80%	1,543,559.34
34	06	610	9,802,000,384	2,422,127	108.61%	6,580,185.42

Figure 11.



	A	B	C	D	I	J
1	HR	PA_NO	AREA (M^2)	Acres	% of Mean	AF-2001
2	01	101	9,731,000,320	2,404,583	56.96%	2,724,867.56
3	01	102	18,456,000,512	4,560,577	54.43%	10,383,853.38
4	01	103	17,841,999,872	4,408,854	65.60%	11,489,249.96
5	01	104	4,240,999,936	1,047,974	67.25%	2,175,634.12
6	02	201	4,364,000,256	1,078,368	72.79%	2,194,911.79
7	02	202	7,290,999,808	1,801,645	87.66%	3,013,075.49
8	03	301	13,656,999,936	3,374,718	96.59%	5,027,970.69
9	03	302	15,669,000,192	3,871,894	116.15%	6,323,025.87
10	04	401	6,088,999,936	1,504,625	114.34%	2,384,529.45
11	04	402	4,983,000,064	1,231,326	105.02%	2,178,917.67
12	04	403	7,255,000,064	1,792,750	81.18%	2,631,020.05
13	04	404	9,978,000,384	2,465,618	82.12%	2,987,587.02
14	05	501	18,016,000,000	4,451,851	61.49%	7,542,909.82
15	05	502	5,096,999,936	1,259,496	75.90%	3,028,051.25
16	05	503	3,319,000,064	820,143	85.40%	1,994,613.94
17	05	504	6,741,000,192	1,665,737	73.24%	4,755,752.48
18	05	505	3,964,999,936	979,773	80.71%	1,974,554.69
19	05	506	4,336,999,936	1,071,696	83.78%	1,839,088.36
20	05	507	3,767,000,064	930,846	75.15%	2,034,271.84
21	05	508	19,537,999,872	4,827,945	57.27%	10,535,297.47
22	05	509	2,488,000,000	614,798	84.68%	953,804.68
23	05	510	1,164,000,000	287,631	81.60%	408,042.96
24	05	511	2,110,000,000	521,392	71.94%	844,934.67
25	06	601	807,000,000	199,414	90.13%	256,940.98
26	06	602	1,620,000,000	400,311	89.34%	470,607.06
27	06	603	3,512,999,936	868,081	80.74%	1,392,495.27
28	06	604	11,470,000,128	2,834,299	71.97%	6,136,932.11
29	06	605	2,000,000,000	494,211	94.91%	576,684.37
30	06	606	2,864,000,000	707,710	95.72%	703,943.80
31	06	607	1,598,000,000	394,874	86.44%	514,880.16
32	06	608	1,407,000,064	347,677	88.41%	455,831.89
33	06	609	4,280,000,000	1,057,611	92.94%	1,249,658.61
34	06	610	9,802,000,384	2,422,127	77.36%	4,686,783.40

Figure 12.